UNITED STATES DEPARTMENT OF THE INTERIOR
BLM, BOISE DISTRICT

EA #ID120-2007-EA-1 Title Page

Applicant (if any): **John Anchustegui**	Proposed Action: **Conversion of Type of Livestock to Domestic Sheep in Pasture 17, East Castle Creek Allotment**			EA No. **ID-120-2007-EA-1**
State: **Idaho**	County: **Owyhee**	District: **Boise**	Field Office: **Bruneau**	Authority: **NEPA, FLPMA, & Taylor Grazing Act**
Prepared By: **BFO ID Team**	Title: **Various**			Report Date: **6/12/07**

LANDS INVOLVED

Allotment	Meridian	Township	Range	Sections	Acres
East Castle Creek	**Boise**	**8S**	**1E**	**7, 8, 9, 10, 17**	**466 federal**

Consideration of Critical Elements	N/A or Not Present	Applicable or Present, No Impact	Discussed in EA
Air Quality	X		
Areas of Critical Environmental Concern	X		
Cultural Resources	X		
Environmental Justice (E.O. 12898)	X		
Farm Lands (prime or unique)	X		
Floodplains	X		
Migratory Birds	X		
Native American Religious Concerns	X		
Invasive, Nonnative Species	*		
Wastes, Hazardous or Solid	X		
Threatened or Endangered Species			X
Social and Economic	X		
Water Quality (Drinking/Ground)	X		
Wetlands/Riparian Zones			X
Wild and Scenic Rivers (Eligible)	X		
Wilderness Study Areas			X

*Not addressed in this EA.

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INTRODUCTION

Proposed Action

On October 31, 2006, John Anchustegui of Boise, Idaho, a grazing permittee, filed an application to convert the kind of livestock that he grazes from cattle to sheep on federal lands (CFR 4130.1-1) in pasture 17 of the East Castle Creek allotment of the Bruneau Field Office (BFO), Boise District BLM. The numbers he requested to convert are 54 Animal Unit Months (AUMs), which equals 54 cows for one month or 270 sheep for one month (1 AUM = 1 cow or 5 sheep for a month, CFR 4130.8-1). Mr. Anchustegui owns the permit for 2,377 AUMs and leases an additional 278 AUMs in the East Castle Creek allotment; including other allotments, his permits on the BFO total 3,101 AUMs, all cattle. The 54 AUMs in question are 1.8% of his total AUMs in the BFO. Mr. Anchustegui has had the grazing permit in pasture 17 since 2004. There has been no sheep grazing on pasture 17 since 1952; it has been all cattle grazing. Currently, all grazing permits in the BFO are for cattle or horses; there are no sheep permits. Most sheep grazing in the BFO ended in the 1960s, and the last sheep permit ended in 1974.

Purpose and Need

Mr. Anchustegui applied for a grazing permit to convert kind of livestock from cattle to sheep (CFR 4130.1), and the BLM must respond (IM ID-2004-086). Mr. Anchustegui states that he usually has a small band of sheep that are not able to be trailed and grazed over long distances that would do better in a smaller pasture, such as pasture 17. His cattle grazed pasture 17 in September and October of 2004 through 2006, the 3 years that he has had this permit, but water is limited then and tends to restrict cattle distribution. He believes that the mountainous country and limited water sources would be less of a problem for domestic sheep than for cattle, because of their natural grazing habits. He has both cattle and sheep permits in the Four Rivers Field Office (Boise District BLM), Twin Falls District BLM, and on adjoining National Forests.

Conformance with the Land Use Plan, Policy, Regulations, and Guidance

The 1983 Bruneau Management Framework Plan (MFP) is the land use plan (LUP) for land managed by the BFO. There are different interpretations about whether or not this proposal is in conformance with the MFP, as required by 43 CFR 1610.5-3(a). The MFP states that (WL 2.1 (4)) "the conversion of existing cattle use to domestic sheep use will not be allowed unless the use will not be within one mile of the habitat and reasonably be guaranteed to be maintained by physical barrier of, but not limited to, fences and canyons". The currently mapped boundary for bighorn sheep habitat is located approximately 1.5 miles from the pasture proposed for conversion from cattle to domestic sheep. This habitat boundary delineates "core" habitat, where sheep usually live, but does not include all travel habitat where sheep have been sighted. Bighorns are known to roam widely, and have been sighted several miles outside of the core habitat line on BLM maps (See the discussion below under Special Status Wildlife). The MFP is not specific about what constitutes habitat, and indeed it is not possible to draw an absolute habitat line for a wide-ranging animal like bighorn sheep. Although the core bighorn habitat is greater than one mile from pasture 17, there are no physical barriers that would reasonably guarantee separation of bighorns and domestic sheep. The BFO is currently in the process of developing a new Resource Management Plan (RMP) which will replace the MFP as the guiding land use plan for the BFO; however, that plan has not yet been finalized.

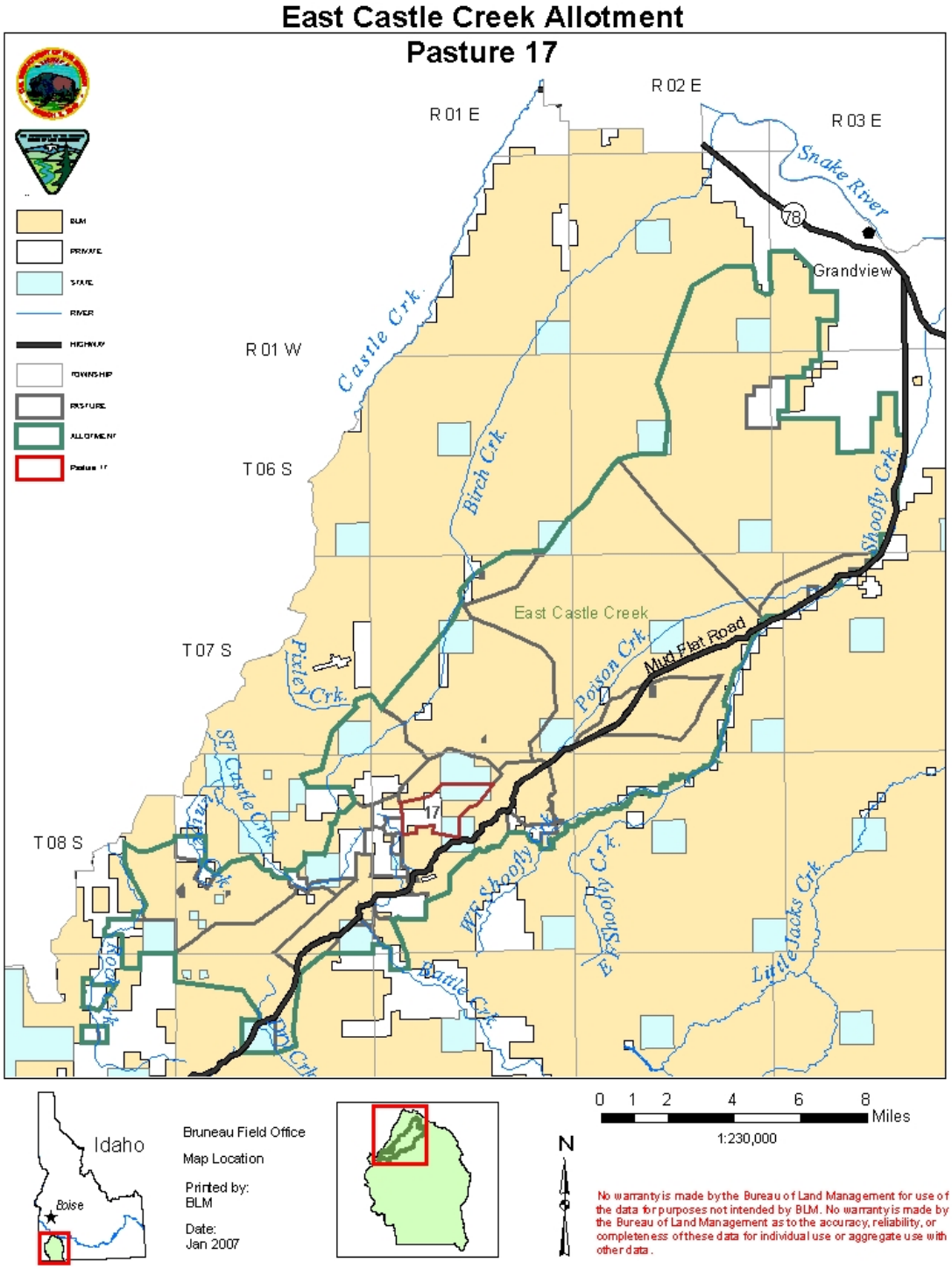
In June 1998, the BLM issued Instructional Memorandum (IM 98-140) *Revised Guidelines for Management of Domestic Sheep and Goats in Native Wild Sheep Habitats,* as part of an ongoing effort to restore bighorn sheep populations to historically occupied habitats on public lands. These guidelines were revised in 1998, with assistance from representatives of state and federal agencies and the domestic sheep industry. The 1998 guidelines were a revision of the 1992 Guidelines (IM 92-264), were based on best available science and were developed in order to encourage a balanced approach for management of domestic sheep and free-ranging goats in native wild sheep habitats. This IM outlines steps which should be taken to physically separate wild and domestic sheep on BLM lands. It acknowledged that North American native wild sheep did not evolve with domestic livestock and therefore are vulnerable to a variety of diseases and parasites carried by livestock, particularly domestic sheep and goats.

Guideline 3 in IM 98-140 addresses this issue, stating that "Native wild sheep and domestic sheep or goats should be spatially separated to reduce the potential of interspecies contact". Guideline 4 expands on this: "In reviewing new domestic sheep or goat grazing permit applications or proposed conversions of cattle permits to sheep or goat permits in areas with established native wild sheep populations, buffer strips surrounding native wild sheep habitat should be developed, ranging up to 13.5 km (9 miles) except where topographic features or other barriers minimize contact between native wild sheep and domestic sheep or goats." This IM represents current BLM direction and guidance. There are different interpretations whether the proposed action is in conformance with the guidelines.

On August 12, 1997, Idaho's Standards for Rangeland Health and Guidelines for Livestock Grazing Management were approved by the Secretary of the Interior. Subsequently, livestock management practices must be in conformance with Idaho's Standards for Rangeland Health and Guidelines for Livestock Grazing Management, which is in compliance with 43 CFR 4180.1. BLM is currently in the process of developing the Draft Standards and Guidelines Assessments for the East Castle Creek allotment, which includes pasture 17.

Location

Pasture 17 is located in southwest Idaho, in the Owyhee Mountains about 60 miles south of Boise, Idaho and 20 miles southwest of Grandview, Idaho (legal location: Township 8S, Range 1E, Sections 7, 8, 9, 10, 17, Boise Meridian). It is part of the East Castle Creek allotment (#0893), within the Bruneau Field Office of the Boise District BLM (Map 1). It is situated in the Poison Creek drainage just to the west of Mudflat Road, about 2 miles above the Poison Creek Picnic area. Pasture 17 is comprised of federal, private, and state lands, with federal land making up less than 50% of the pasture (466 acres). Core habitat for the Jacks-Shoofly Creek herd of California bighorn sheep is located approximately 1.5 miles to the east of this pasture. There are no physical barriers between the bighorn sheep habitat and pasture 17 to preclude contact. The pasture is surrounded by a barbed-wire fence which does not form a barrier to either domestic or bighorn sheep.



Map 1. Location of pasture 17 of the East Castle Creek allotment. Bruneau Field Office, Boise District BLM.

Grazing History
The lands within pasture 17 were grazed by both cattle and sheep before 1952, primarily in the spring each year, as part of the Pole Creek Unit. Then, on December 15, 1952, BLM granted a Section 4 permit (#230) to Milton Carothers and Emery Ratliff to fence small parcels of federal lands in with private and state lands to create the current pasture 17. After that time, the lands within pasture 17 were grazed by cattle primarily in the fall after the end of the permitted use period in the rest of the allotment. Thus, for the last 55 years, the lands in pasture 17 have been used by cattle in the fall. The permit was transferred from Daryl Keck to John Anchustegui in 2004 under GRN#1100291.

Pasture 17, which has less than 50% federal land, is licensed from April 1 to November 30 and may be "used at the discretion of the permittee, unless monitoring or allotment inspection indicate adverse impact to public resources, and as long as this use is consistent with allotment goals and objectives" (BLM's Final Decision of August 21, 1990 and the Grazing Agreement with the East Castle Creek permittees of January 6, 1993). The recognized preference on the federal lands in pasture 17 is 54 AUMs for cattle.

Pasture 17 is located in a mountainous portion of the allotment and the federal land within this pasture is primarily steep slopes. The included private base lands have most of the water sources and gentle slopes that are preferred by cattle. However, the available water sources tend to dry up over the summer.

ALTERNATIVES

Alternative A – Continue Current Management
There would be no change to the current livestock grazing permit. John Anchustegui's grazing permit for pasture 17 is currently shown on permit #1100291, which also includes pasture 15. These are billed as a single line. The livestock numbers are nominal, and are defined by the permitted season of use and AUMs. Permit #1100291 is currently defined as follows:

	Preference				
Allotment	Active	Suspended	Total	Kind	Season of Use
East Castle Creek	71	0	71	cattle	4/1 to 11/30

Pasture	#Livestock	Use Period	%PL	Type Use	AUMs
15	2 cattle	4/1 to 11/30	100	Active	17
17	7 cattle	4/1 to 11/30	100	Active	54
					71

The lands within pasture 17 are grazed by cattle primarily in the fall.

Alternative B – Proposed Action: Conversion to Sheep Grazing
For pasture 17, the type of livestock in the permit would change from cattle to sheep as follows:

From:	Pasture	#Livestock	Use Period	%PL	Type Use	AUMs
	15	2 cattle	4/1 to 11/30	100	Active	17
	17	7 cattle	4/1 to 11/30	100	Active	54
						71
To:	Pasture	#Livestock	Use Period	%PL	Type Use	AUMs
	15	2 cattle	4/1 to 11/30	100	Active	17
	17	34 sheep	4/1 to 11/30	100	Active	54
						71

The permitted sheep use within pasture 17 would be from spring through fall. Sheep would be attended by a herder to minimize losses due to predation; however, the sheep would not be actively herded. Because no change is proposed in pasture 15, this pasture will not be discussed further.

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Special Status Wildlife

The only sensitive species that could clearly be affected by conversion to domestic sheep would be bighorn sheep.

Affected Environment – Special Status Wildlife

A herd of 250-450 California bighorn sheep inhabits the deep canyons and adjacent plateaus of Shoofly, Little Jacks, and Big Jacks creeks –adjoining the East Castle Creek allotment on the east. Another small herd of about 30 bighorns inhabits the lower part of the canyon of Castle Creek, on the west side of the allotment (Map 2). The herd in Castle Creek was likely started by immigrants from the Jacks Creek herd; they were not reintroduced there.

Bighorn sheep formerly were common in southwest Idaho, but were eliminated in the late 1800's and early 1900's after Europeans and their domestic livestock entered the area. The causes of the eradication of bighorn sheep were diseases introduced from domestic sheep, overhunting, and competition with domestic livestock for forage (Buechner 1960, Jessup 1991).

Bighorn sheep are divided into several subspecies: California, Rocky Mountain, and Desert. California bighorn sheep are an Idaho BLM Sensitive Species and are the subspecies that originally occupied the deserts of southwest Idaho before settlement. Although the majority of their range was in eastern Oregon and southwest Idaho, they are called 'California' because a small population in California and one in British Columbia were the only ones that remained after they were extirpated in Oregon, Washington, and Idaho.

In 1967, Idaho Department of Fish and Game (IDFG) reintroduced California bighorn sheep from British Columbia into Little Jack's Creek, and reintroductions in other areas of Owyhee County occurred through the 1980's. Their total population in the BFO peaked during the 1990's at 1,400-1,500 animals, and has since decreased to 650-1,000 animals (Table 1). In 1993, the

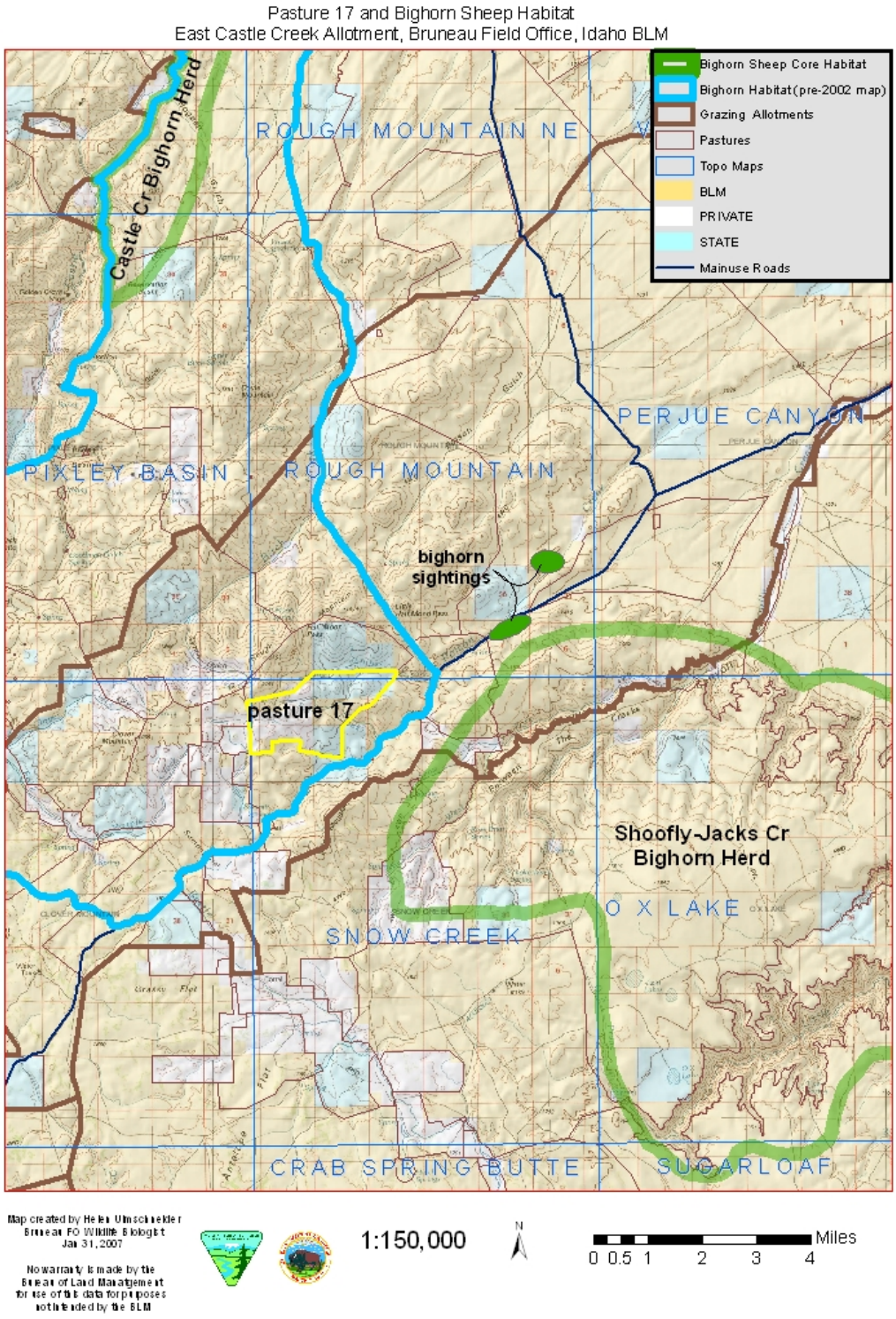
sheep populations in southwest Idaho, primarily in Owyhee County, constituted one-quarter of the total California bighorn sheep population in the United States (USDI 1995b).

Currently in the BFO there are bighorn herds established in the Big Jacks, Little Jacks and Shoofly complex, Castle Creek, the Bruneau Canyon, and in Battle Creek, Deep Creek and Dickshooter Creek of the Owyhee River drainage (Map 2). About 30 bighorns use the Shoofly Creek area (Jon Rachael, IDFG, pers. comm., Dec. 2006), and these animals intermix with the Big and Little Jacks herd. It is mainly the rams that wander between drainages; the ewes tend to stay in one place.

Bighorn sheep are one of the most prized game animals in the West. Idaho bighorn hunting permits have been auctioned for up to $180,000. The peak number of 62 hunting permits was issued in 1994, and 40 animals were harvested; only 13 permits were issued and 6 sheep were harvested in 2004. Idaho Department of Fish and Game reduced sheep hunting permits in response to declining population numbers, from unknown causes. Bighorn viewing is also a very popular activity by river rafters and other recreationists (USDI 1995b).

Table 1. Bighorn sheep reintroduction dates and population estimates by IDFG, in the Bruneau Field Office.

Canyon	**Reintroduction date**	**Peak population**		**Current count (2006)**
		number	**year**	
LittleJacks-Shoofly Creek	1967	275	1997	109
Big Jacks	1987	225	1997	125
Bruneau-Jarbidge	1984	225	1997	107
Owyhee R Idaho	1963	750	1992	355
Totals		**1465**	**1997**	**696**



Map 2. Location of pasture 17 of the East Castle Creek allotment, in relation to bighorn sheep herds. Bruneau Field Office, Boise District BLM.

Environmental Consequences –Special Status Wildlife

Alternative A – current grazing by cattle
With no change in type of livestock permitted nearby, the Shoofly-Little Jacks-Big Jacks herd of bighorn sheep would continue, with population numbers varying from factors such as rainfall and predators, and with no known impacts from current authorized grazing practices in the East Castle Creek allotment.

Alternative B – conversion to sheep grazing
Because of the potential adverse effects on bighorn sheep due to disease transmission from domestic sheep, most wildlife professionals, wildlife veterinarians, and researchers have concluded that bighorn sheep and domestic sheep should not occupy the same ranges or be managed in close proximity to each other (Martin et al. 1996). Pasture 17 of the East Castle Creek allotment is within 1.5 miles of the Little Jacks-Shoofly Creek bighorn sheep core habitat (Map 2). Below we summarize the information on disease transmission between domestic and bighorn sheep, discuss dissenting views, and then analyze the situation with pasture 17 and the Shoofly- Jacks Creek and Castle Creek bighorn herds.

Disease Summary
The risk of fatal epidemics of bacterial pneumonia in bighorns due to disease transmission from domestic sheep (Foreyt 1994) is the main concern with permitting domestic sheep grazing in close proximity to bighorn sheep. Pneumonia caused by *Pastuerella* bacteria *(*now re-named *Haemolytica)* has been identified as the cause of most of the massive die-offs of bighorn sheep in recent times (Goodson 1982, Martin et al. 1996).

There are four basic lines of evidence that domestic sheep can carry and transmit fatal disease to bighorns in the wild:

1) the historic massive die-offs of bighorns across the west with the arrival of domestic sheep and the accounts of eyewitnesses of the time of the causes of death (Goodson 1982, Jessup 1991);
2) more recent die-offs in bighorns in the wild after contact with domestic sheep across the decades and throughout the West and Canada (Goodson 1982, Martin et al. 1996, Garde et al. 2005, USDA 2006);
3) captive trials where almost all bighorns died of pneumonia and all domestic sheep remained healthy after being penned together or inoculated with *Pastuerella* from domestic sheep (Callan et al. 1991, Foreyt and Jessup 1982, Foreyt 1989, Foreyt 1994, Onderka and Wishart 1988, Onderka et al. 1988); and
4) DNA studies showing domestic sheep strains of *Pastuerella* transmitted in the wild to bighorn sheep, which then died (Hunter et al. in prep).

These are detailed below.

Historic: Bighorn sheep were widespread and common throughout western North America. Populations declined dramatically in massive die-offs in the late 1800's to early 1900's, so that biologists were worried about extinction. Die-offs coincided with dates of introduction of

domestic sheep. They were extirpated completely from much of their range, and the remnant populations coincided with areas that lacked domestic sheep. The severe and widespread die-offs of bighorn sheep were often attributed to scabies, and also competition with domestic livestock for forage, and over-hunting (Honess and Frost 1942, Couey 1950, Buechner 1960). Scabies was not observed in bighorn sheep prior to the introduction of domestic sheep (Buechner 1960). Pneumonia was not identified as a cause of death by the early observers.

Recent Die-offs: Goodson (1982) researched bighorn and domestic sheep interactions throughout the West and Canada in more recent times. He details case studies in Montana, Utah, Nevada, New Mexico, and British Columbia where bighorns died in large numbers after domestic sheep grazed on their ranges.

A few examples from Goodson (1982) illustrate the connection between domestic sheep grazing and the die-offs of bighorns. In New Mexico in 1981, all of a herd of 50 bighorns (introduced in 1978) died after 115 domestic sheep were allowed to graze an allotment which had been vacant for 10 years. Bronchopneumonia was the cause of death of four necropsied bighorns.

In British Columbia, three die-offs of bighorns occurred following contact with domestic sheep on their ranges. In 1939, about 100 domestic sheep were introduced onto the range of a bighorn herd near Kootenay National Park. In the fall, bighorn rams were observed breeding domestic ewes. A die-off of bighorns began the following winter, with pneumonia diagnosed as the proximate cause of death.

In 1961 or 1962, in the Bull River Range, sheep began grazing on a range which had not been grazed except for one period in 1955. In January 1965, bighorns were seen feeding on the rancher's haystacks with his domestic sheep. A die-off followed in the bighorns which reduced the herd from 250 to 8 animals. The die-off spread north 80 miles through 6 contiguous bighorn ranges over the next 2 years. About 70% of the bighorns in the 6 herds died from acute pneumonia.

In 1981-82, about half of a herd of 50 bighorns died of pneumonia during December-January in the Maquire Creek-Red Canyon range in BC. Domestic sheep had begun grazing this range in 1978 during the summer. However in October 1981, the bighorn herd was known to be in direct contact with about 60 domestic sheep (Davidson 1982a, b).

Nose-to-nose contact or exposure to mucus through coughing or sneezing is necessary for transmission of the fatal bacteria to occur. The factor that increases risk of this happening is that bighorns are attracted to domestic sheep. Young bighorn rams, in particular, may roam up to 40 miles from the home herd, looking for females, and then return to their home (unpublished telemetry data from Hells Canyon). They are known to seek out domestic sheep and associate closely with them, and even try to mate with them. They can then return to their herd and transmit disease contracted from domestic sheep. Bighorn ewes have also been known to associate with domestic sheep (Hunter et al. in prep.) Additionally, on occasion domestic sheep may stray or run when spooked and be lost for months.

In the die-offs, 75 to 100% of the herd is usually lost, often the deaths occurring within a few weeks of contact. In some cases, the die-offs progress over several years to more distant herds – up to 80 miles - as in British Columbia in the Bull River range in 1965. If some of the herd survives, lamb survival is affected for 3 to 5 years following the die-off (Foreyt 1990, Coggins and Matthews 1992, Ward et al. 1992, Foreyt 1995, Hunter 1995). Lambs contract the pneumonia bacteria from their mothers, who remain carriers. After the immunity gained from nursing their mothers wears off, the lambs die from pneumonia, typically at 6 to 8 weeks of age.

Bighorns are also susceptible to die-offs from pneumonia without contact with domestic sheep (Goodson 1982, Onderka and Wishart 1984, Foreyt 1989, and Ryder et al. 1994). Bighorns normally carry some strains of *Pasturella haemolytica*. *P. haemolytica* is divided into two biotypes, biotype A found in domestic sheep and biotype T found in wild sheep. Each biotype has many strains. In the die-offs that occur from biotype T strains that are normal in wild sheep, only 15 to 35% of the herd is usually lost. These die-offs appear to be triggered by stress such as a severe winter or overpopulation. In the die-offs that occur from biotype A strains from domestic sheep, 75 to 100% of the herd is lost (Schommer and Woolever 2001).

Bighorn sheep and domestic sheep are more closely related to each other than any other wild ungulates with domestic livestock. They have interbred and produced offspring, although the offspring generally developed pneumonia before 3 months of age and had to be treated to prevent death (work at the Sybille Wildlife Research Unit of the Wyoming Dept. of Fish and Game, reported in Goodson 1982).

Bighorn sheep have not been able to recover from the decimation of their populations, in contrast to deer, moose, and elk. Bighorn sheep penned with elk, mule deer, white-tailed deer, llamas, and domestic goats remained healthy, although these other ungulates also carry their own typical strains of *Pasturella*. Bighorns penned with mouflon sheep and domestic sheep died (Foreyt 1994). Because the other wild ungulates do not have close relatives among domestic livestock, they do not have the disease problem that bighorns have with domestic sheep.

Captive Cases and Trials:
Foreyt and Jessup (1982) detailed two cases in Washington and California of bighorns dieing soon after exposure to domestic sheep. In Lava Beds National Monument, California, a herd of bighorns had been kept in a very large exclosure of close to two square miles (445 ha) for 9 years, and were "in excellent physical condition" and reproducing. In mid–June 1980, domestic sheep were intensively grazed along 2 sides of the exclosure, and nose-to-nose fenceline contact was noted. Approximately 8 bighorns died during the first 10 days of July, of *Pastuerella* pneumonia. "All 43 bighorn sheep were presumed dead by August 15, 1980, since no live animals could be located." Culturing studies could not be done because the bighorns were found too long after death.

In Washington, in January 1979, 8 wild bighorns were transported to a 2.5 ha enclosure in a remote area with a natural stream, native trees, shrubs, and grasses. The bighorns lambed there and the lambs and adults thrived over the summer. After 10 months in the enclosure, on Nov. 2, 1979, 11 healthy domestic sheep were placed in the enclosure with the bighorns. On 28 Nov. 7 bighorns were found dead. They had been dead too long for taking bacterial samples. The

domestic sheep were removed on Dec 8, 1979, and the remaining 7 bighorns appeared healthy. Six of the seven were found dead on Jan 29, 1980, and had been dead for several days. Examination revealed acute pneumonia in all animals from both episodes.

In subsequent years, Dr. Foreyt and others conducted trials exposing captive bighorns to domestic sheep in controlled situations to investigate the potential disease transmission. In a declaration for a court case, Dr. Bill Foreyt from Washington State University Veterinary School (1995) summarized his and other's work on this problem as follows:

> "In summary, of all published reports of contact between bighorn sheep and domestic sheep under controlled conditions, 33 of 35 (92%) of the bighorn sheep have died from pneumonia. Twenty-eight of 28 (100%) domestic sheep remained healthy. Of all published reports of bighorn sheep and domestic sheep inoculated with *Pasteurella haemolytica* from domestic sheep, 9 of 10 (90%) of the bighorn sheep have died from pneumonia, and 7 of 7 domestic sheep have remained healthy" (Foreyt and Jessup 1982, Foreyt 1989, Foreyt 1990, Foreyt 1994, Foreyt et al. 1994, Onderka et al. 1988, Onderka and Wishart 1988, Callan et al. 1991).

DNA studies: Hunter et al. (in prep.) detail two cases of bighorns dying of pneumonia after contact with domestic sheep in the wild. In the first case, a ewe was transplanted into southeast Oregon, and was swabbed and tested for bacteria before transplant. Six months later, she was seen associating with domestic sheep, and according to Oregon Department of Fish and Wildlife policy, was captured and removed from the wild to the Idaho Wildlife Lab, to prevent infecting the rest of the herd with disease. She died 7 days later from pneumonia. Upon necropsy and subsequent DNA tests, the cause of death was determined to be a domestic sheep strain of *P. haemolytica* identical to that found in the domestic sheep she had been associating with. She had not had this strain when tested 6 months earlier. This study proved disease transmission on the range of the specific disease agent from domestic to wild sheep.

The second case was of a ram found associating with domestic sheep ewes for less than 48 hrs., and removed from the wild. He died of pneumonia 7 days later, from the same type of *P. haemolytica* that had killed the ewe (biotype A, BG1), and which was also isolated from the domestic sheep he had associated with. Upon culturing the domestic sheep, they shared types of *Pasteurella* with the bighorn ram that are usually found in bighorns and not domestic sheep. This case did not have pre-exposure data, but showed that after less than 48 hours of contact, the domestic and wild sheep shared in common types of *P. haemolytica* usually found in the other species. Stress from capture could have triggered the pneumonia in both cases.

Dissenting views: Disease transmission from domestic to wild sheep on the range is not accepted as proven by all. Drs. Annette Rink, DVM (Nevada Department of Agriculture) and Don Knowles (DVM) discuss some issues in a paper they prepared for the American Sheep Industry Association and the Public Lands Council, and submitted to DOI in 2006. The issues they outlined (*in italics*) and our analyses are given below:

1) What is the actual risk of disease transmission under natural range conditions as opposed to experimental conditions, given that physical contact is necessary for Pasteurella transmission?

Close association between domestic and bighorn sheep in the wild is documented in many of the papers cited as well as in anecdotes. Bighorn rams will sniff and try to mate with domestic ewes. Ward et al (1997) and Hunter et al. (in prep) document cases of transmission of bacteria on the range from sheep to bighorns using DNA fingerprinting.

2) There are other factors affecting bighorn disease such as genetic susceptibility to disease, or disease from other wildlife.

It is true that there are other factors that influence and cause disease in bighorns, but that does not mean that managers should ignore domestic sheep as a factor.

Published papers agree that there is a complex of factors that affect bighorn susceptibility to disease, including stresses such as population highs, lungworms, severe weather or food shortage. If bighorn sheep have low genetic variability now which causes increased susceptibility to disease, it is due to the original die-offs. It is just a reality that has to be dealt with. Game agencies try to maximize genetic variability when they reintroduce bighorns. The only literature we found on disease transmission from other wildlife was Foreyt's study (1994), which found no disease transmission from deer, elk, or moose. Foreyt and Lagerquist (1996) also studied disease transmission between horses, cattle and bighorns. One of nine bighorns died while penned with cattle, from *Pasteurella* pneumonia.

3) There have been wrong conclusions in the past about causes of disease in other animals (they list four cases).

This argument does not affect whether this case is true or not, but it is always good to use critical thinking even about generally accepted ideas.

4) There have been bighorn die-offs from other causes.

True. Pneumonia from *Pasteurella* is accepted as the biggest threat currently, and die-offs are known to occur from native bighorn as well as domestic strains of the bacteria. Additionally, there are many other documented diseases in bighorns, including scabies and lungworm, which have been implicated or proven in die-offs.

There are no published papers documenting compatibility between domestic and bighorn sheep. The paper discussed above was the only literature we found on the dissenting side of the issue. Therefore, wanting to fairly understand all sides of the issue, we contacted key scientists involved in the debate by phone.

In a phone conversation with Dr. Glen Weiser of the Caine Veterinary Teaching Center in Caldwell, Idaho (1/18/2007), he raised the points and concerns detailed below. His general view is that the risk is overstated, that most wildlife people believe that bighorns always die after contact with domestics, but that is not proven on the range:

- He sees slight flaws in Dr. Foreyt's captive studies: they lacked the bacteriologic work that is done now, to determine exactly what was transmitted and caused the bighorn

deaths, because they did not have the techniques then. Additionally, the response of captive animals to disease may be different than free-ranging animals.
- The field evidence is circumstantial, though that doesn't mean its wrong.
- The hard proof of the disease mechanism and organisms is not there: there is not a clear correlation between one *Pasteurella* strain and bighorn die-offs. There is not a large-scale pneumonia die-off that is proven as caused by domestic sheep by bacteriologic studies.

He did agree that there is a significant risk of disease transmission from domestic to wild sheep, that managers need to be cautious about mixing domestic and bighorn sheep, and that domestic sheep strains of *Pasteurella* tend to be more virulent for bighorns than their native strains. He also said that *Pasteurella* viability declines very fast with the death of the bighorn, making it difficult to sample on the range, and determine exactly what type or strain caused the death. Thus the kind of clear-cut bacteriological proof asked for by the dissenting viewpoint is difficult to acquire in reality. It is difficult to prove transmission without pre- and post- cultures done on both bighorns and domestics.

On November 2, 2006, an expert science panel convened in Boise, Idaho to discuss disease transmission from domestic to bighorn sheep, prompted by appeals to the revised Payette National Forest Plan (USDA 2006). Dr. Annette Rink, Dr. Glen Weiser, and Dr. Alton Ward were all members of the panel, representing some dissenting views. Despite differences of opinion, all members of the panel agreed to the following statements (among others):

1a) Scientific observation and field studies demonstrate that "contact" between domestic sheep and bighorn sheep is possible under range conditions. This contact increases risk of subsequent bighorn sheep mortality and reduced recruitment, primarily due to respiratory disease.

1b) The complete range of mechanisms/causal agents that lead to epizootic disease events cannot be conclusively proven at this point.

1c) Given the previous two statements, it is prudent to undertake management to prevent contact between these species.

Dr. Marie Bulgin of the Caine Veterinary Center in Caldwell, Idaho commented on the draft EA. Her most basic point was that the Caine Veterinary Center has been involved in researching bighorn-domestic sheep disease transmission for 17 years and has not been able to prove domestics as the cause of any major die-offs. However, neither have they been able to prove that domestic sheep were not the cause. The causes and studying them have been more complex than the simple model of one disease agent transmitted by sheep. Her letter enumerates many of the complexities and difficulties of studying this problem, and forms an explanation of why 17 years of research has not proven the situation in either direction.

The published cases studied by the Caine Veterinary Center were 4 cases in Nevada (Ward et al. 1997) and a goat transmission case in Hell's Canyon (Rudolph et al. 2003 and Weiser et al. 2003). Neither was definitive in answering the causes of die-offs. In Nevada, two bighorn herds died out after contact with domestic sheep but the cause was never determined because they did

not find the dead animals; two bighorn herds thrived after incidents of contact with one ram in one case, and one ewe and lamb in another. Transmission of bacteria was shown with the ram, but did not result in an epidemic. Foreyt's studies showed that not every individual domestic sheep carried lethal strains, so it is possible that contact with one individual and/or the rapid response in removing those bighorns prevented an epidemic.

In Hell's Canyon, a bighorn pneumonia epidemic followed contact with 2 feral goats. The first 2 bighorns that died had *Pasteurella multocida* strains that matched the goats'. But the subsequent deaths were "associated" with many other genetic strains, and no one strain appeared to be the cause of the epidemic. The cause of the epidemic remained unexplained. Dr Bulgin's comment letter and a more detailed response is provided as Attachment 1.

Analysis of Pasture 17 Situation

Pasture 17 lies in between the Shoofly - Little Jacks - Big Jacks (hereafter called Jacks Creek) and the Castle Creek bighorn herds. It is approximately 1.5 miles west of the Jacks Creek bighorn herd habitat line and about 7 miles south of the Castle Creek habitat line. Pasture 17 lies to the west of Poison Creek, about halfway up a moderate-to-steep slope, and the Jacks Creek bighorn habitat line sits at the top of a similar slope on the east side of Poison Creek (see Attachment 2). There is no physical, topological, or other barrier to sheep movement between the two. There is a barbed-wire fence around pasture 17, but bighorn sheep can jump an 8-ft fence (Tim Schommer, pers. comm.) A person could walk from pasture 17 to the Jacks Creek habitat line in an hour.

The 1983 Bruneau Management Framework Plan states "the conversion of existing cattle use to domestic sheep use will not be allowed unless the use will not be within one mile of the habitat and reasonably be guaranteed to be maintained by physical barrier of, but not limited to, fences and canyons". Additionally, in 1998, the BLM issued revised guidelines – with buffers up to 9 miles- for management of domestic sheep and goats in native wild sheep habitats (Instruction Memorandum No. 98-140). The relevant guidelines are quoted below:

"2. Domestic sheep or goat grazing and trailing should be discouraged in the vicinity of native wild sheep ranges."

"4. In reviewing new domestic sheep or goat grazing permit applications or proposed conversions of cattle permits to sheep or goat permits in areas with established native wild sheep populations, buffer strips surrounding native wild sheep habitat should be developed, except where topographic features or other barriers minimize physical contact between native wild sheep and domestic sheep and goats. Buffer strips could range up to 13.5 kilometers (9 miles) or as developed through a cooperative agreement to minimize contact between native wild sheep and domestic sheep and goats, depending upon local conditions and management options."

"9. Extraordinary precautions will be followed to protect special status subspecies, e.g., federally listed threatened, endangered, proposed and candidate subspecies, State listed subspecies and BLM sensitive subspecies."

Radio-telemetry data from Hells Canyon bighorns shows that rams can move as far as 40 miles from their home ranges, primarily during the rut, and then return to their home herd (Hells Canyon Restoration Committee, unpublished data). A radio-telemetry study of the Jacks Creek herd in the 1990's documented movement to and from Castle Creek (Matt McCoy, pers. comm.) Bighorn sheep in the BFO have expanded since 1983 into Castle, Mary's, Shoofly, Wickahoney and Duncan creeks.

The BLM's bighorn sheep habitat map was drawn and has been updated by BLM, USGS and IDFG biologists familiar with bighorn habitat use in the BFO from on-the-ground observations, radio-telemetry studies, and aerial surveys. The most recent update of the map in 2002 was done from consultations with Lou Nelson (IDFG), Matt McCoy (BLM), and Elroy Taylor (USGS).

Habitat lines for any wide-ranging species are only approximations, and it is unrealistic to say that the bighorns do not use anything outside of the lines in Map 2. One of the changes made during the 2002 update of the 1987 bighorn habitat maps was to eliminate a large area between the Mudflat Road and Castle Creek that includes pasture 17 as bighorn habitat. This area was originally included in the map of bighorn habitat because bighorns had been seen in that zone, and a new small herd became established near the mouth of Castle Creek, which now numbers about 30 animals. Biologists thought that the foothills between were used for traveling between core habitats of Jacks and Castle Creeks. In 2002, that area was eliminated because it represented travel habitat as opposed to core home range, and we were depicting home range type of habitat on the BLM map. Thus, pasture 17 is within the area that bighorns likely crossed and still cross occasionally between the Jacks and Castle Creek populations.

Bighorns have been spotted near the bottom of the Poison Creek grade to the west of Mudflat Road, and on the Mudflat Road near the Poison Creek picnic area, outside of the habitat line on Map 2 (Matt McCoy and Steve Jirik, Boise District BLM, pers. comm.) Additionally, a well used trail leading down to a pond halfway from the ridge to Poison Creek has probable bighorn scat along it, outside of the habitat line and within 1 mile of pasture 17 (see Attachment 2).

In any case, pasture 17 is within sight of the ridgetop above Shoofly Creek. Bighorns are attracted to domestic sheep – sheepherders tell anecdotes of bighorns mixing with their flocks (Mitch Jaurena, pers. comm., Dave and Gene Tyndall, pers. comm.) – and there is no barrier to bighorns crossing Poison Creek to get to pasture 17. The buffer distance of 1.5 miles would be inadequate under these circumstances to assure separation of bighorns and domestic sheep.

The bighorns in the BFO do not move between winter and summer ranges, as some bighorns do in snow areas; they occupy essentially the same ranges year-round. Thus there are no opportunities to separate the bighorns and domestics by season.

Conclusion

If domestic sheep were permitted in pasture 17, there is significant risk that bighorns would come into close contact with domestic sheep because of proximity, lack of barriers, attraction, being within sight, and the bighorn travel between the Jacks and Castle Creek herds. From the broad-based evidence presented above, there is also significant risk, were contact to occur, that fatal pneumonia would be transmitted to the bighorns from the domestic sheep that would result

in a die-off of bighorns in Jacks Creek, Castle Creek, and potentially beyond. There is significant potential for a 75-100% kill of the herd. If some of the herd survived, lamb survival could be expected to be very low for 3 to 5 years after the die-off. Thus, were domestic sheep permitted in pasture 17, there would be high risk of significant mortality or even elimination of a nationally significant herd of California bighorn sheep.

If sheep in Shoofly Creek contracted fatal pneumonia, it is possible it would spread beyond the Jacks Creek herd. Because of the large distances sheep have been documented to roam and because of the 80-mile distance that one die-off spread in British Columbia, it is possible that a die-off could spread to the Bruneau and Owyhee River bighorn herds. The Bruneau River heads in northern Nevada, where there are bighorn populations, and the Owyhee River flows into southeast Oregon, and connects to bighorn populations there. Thus there is potential for a die-off to spread into adjacent states.

Soils and Watershed

Affected Environment – Soils and Watershed

The soils in pasture 17 formed in residuum and colluvium derived from granitic parent materials. These soils occur on undulating to steep slopes in a mountainous environment. Soil depths range from shallow to deep and they are well drained to somewhat excessively drained. The major soil series associated with the Loamy 13-16" ecological sites are the Kanlee and Bauscher soils, and the major soil series associated with the Shallow-Claypan 12-16" ecological sites are the Poison Creek and Sharesnout soils. The vegetative condition is nearing or at site potential over most of the area. The erosion hazard from wind and/or water ranges from slight to severe depending on slope and soil surface textures.

Environmental Consequences – Soils and Watershed

Alternative A

Currently this pasture is grazed predominantly in the fall by cattle. Grazing primarily in the fall, when soils are dry and the native plants have met their growth needs, has less impact to both soil/site stability and the general rangeland health (hydrologic and biotic parameters) compared to grazing during the active growth period and/or when the soils are wet. This is especially true when considering the sloping terrain and the fragile nature of the granitic derived soils that are found here. In general, cattle are less prone to utilize the steeper areas in the pasture resulting in less disturbance from hoof action. These areas would remain in better ecological condition and less prone to erosion over the long term.

Alternative B

Because the pasture would more likely be used during spring than in Alternative A, there could be times that grazing would occur when soils are saturated and more prone to physical disturbance by hoof action. Grazing under this scenario could also occur during the growth period of the native perennial bunchgrass species. Because sheep are more adapted to utilizing the steeper sloping areas there could be more physical disturbance to the soils (hoof action) and a decrease in soil/site stability leading to an increase in erosion over the long term.

Riparian and Wetlands

Affected Environment – Riparian and Wetlands

About 1.2 miles of Fall Creek and 0.1 mile of the headwater reach of Lone Juniper Creek are located on public land in pasture 17. Both streams have intermittent to ephemeral stream flows and are tributaries of Poison Creek. Lone Juniper and Fall creeks support riparian-wetland vegetation on about 0.8 mile of stream in pasture 17. Plant communities are dominated by quaking aspen (*Populus tremuloides*) and willows (*Salix* spp). Two spring wetlands are located on public land in pasture 17. One spring is located at the headwaters of Fall Creek and the other spring is located on the eastern slopes of Rough Mountain. The spring wetlands are predominately vegetated with willows and aspen, with a grass understory. Additionally, four aspen stands ranging from 1 to 3 acres in size are located on public lands on hill slopes in pasture 17 where snow pockets provide additional soil moisture.

Riparian areas on Fall and Lone Juniper creeks have dense stands of riparian shrubs and trees with no obvious actively eroding banks, but have not been assessed for functioning condition. The two spring wetlands were assessed as in functional at risk condition in summer 2006, primarily due to the lack of hydric herbaceous vegetation in the understory, and invasion of wetlands by sagebrush and other upland species. Surface water was not present at the springs in late September 2006.

Environmental Consequences – Riparian and Wetlands

Alternative A

Disturbance to streambanks, floodplains, and livestock utilization of riparian vegetation on streams is low under the current grazing use. Cattle predominantly graze pasture 17 in the fall, when wetland herbaceous vegetation is cured and less palatable to livestock. Thus, cattle are currently not concentrating their use on stream riparian areas. Streambanks and wetland soils are also drier in the fall, resulting in less alteration of streambanks and soils by livestock. The two spring wetlands are receiving minor impacts from cattle use (localized hoof shearing of soils and trailing impacts). These impacts would likely continue to occur under this alternative. Spring wetlands would likely remain in functioning at risk condition.

Alternative B

Grazing by sheep in the spring, summer, or fall at the discretion of the permittee could potentially have greater impacts to riparian and wetland areas by grazing these areas in early spring when soils are saturated. However, riparian areas along streams would likely continue to receive light grazing use because sheep tend to graze streambanks less than cattle (Platts 1991). Impacts to spring wetlands from sheep grazing would likely be similar to that from grazing by cattle in the fall. Sheep generally prefer to graze on slopes and upland areas (Platts 1991), but would likely water at springs when surface water is present during spring and early summer, resulting in localized shearing of wetland soils over the short term. Conditions would not likely differ relative to Alternative A over the long term.

Upland Vegetation

Affected Environment – Upland Vegetation

The native grasses and forbs are currently vigorous and abundant in pasture 17, due to grazing after the critical growing season for many years. Mountain big sagebrush and low sagebrush plant communities are the dominant plant communities. They are contained within the D-25 Major Land Resource Area (MLRA). The pasture includes Shallow Claypan 12-16 and the Loamy 13-16 ecological sites. The potential natural vegetative community for the Shallow Claypan 12-16 ecological site consists of low sagebrush (*Artemisia arbuscula*) with Idaho fescue (*Festuca idahoensis*) and bluebunch wheatgrass (*Pseudoroegneria spicata*) as the understory dominants. The growth period for both Idaho fescue and bluebunch wheatgrass is May through June. Composition by weight is approximately 40-60% grass, 15-25% forbs, and 15-30% shrubs. These sites occur where soils are shallow to bedrock (in some cases a duripan layer) or have heavy clay layers in the upper profile. The dominant visual aspect of the site is low sagebrush, Idaho fescue and bluebunch wheatgrass.

The potential natural vegetative community for the Loamy 13-16 ecological site consists of mountain big sagebrush (*A. tridentata vaseyana*) with Idaho fescue and bluebunch wheatgrass as the understory dominants. Composition by weight is approximately 50-65% grass, 5-15% forbs, and 20-30% shrubs. These sites occur where the soils are moderately deep to deep and there is a frigid soil temperature regime (basically sites above 5,400 feet in elevation). The dominant visual aspect of the site is bluebunch wheatgrass and mountain big sagebrush.

Environmental Consequences – Upland Vegetation

Alternative A

Livestock grazing impacts on perennial plants are a function of kind, timing, intensity, season, and duration of livestock use. Currently this pasture is grazed in the fall by cattle, after the critical growth period for perennial grasses has passed and the potential for livestock to adversely affect plants is low. Cattle utilization of perennial plants on the steeper slopes in this pasture is light due to the terrain; subsequently these plant communities are in better ecological condition. Continuing with cattle grazing in the fall would not have increased adverse impacts on the perennial grasses in this pasture.

Alternative B

Under the proposed management, pasture 17 could be grazed by sheep in the spring, summer, or fall at the discretion of the permittee. Spring grazing would occur during the critical growth period for perennial grasses increasing the potential for livestock grazing to adversely affect plants. Vigor, abundance, and reproductive ability of upland vegetation could be reduced by repeated grazing during the critical growth period. Because sheep are more adapted than cattle to grazing on steeper slopes and rougher terrain, utilization in these areas would likely be greater than that under Alternative A. Sheep are also more likely to utilize forbs and shrubs at a greater intensity than cattle.

Special Status Plants

Affected Environment – Special Status Plants

Inventories for BLM special status plant species (SSP) in the East Castle Creek allotment have been limited and no complete and thorough inventory has been conducted in pasture 17 of this allotment. Currently there are no documented SSP located in this pasture. A population of Mud Flat milkvetch *(Astragalus yoder-williamsii)*, a Type 3 BLM SSP, was reported in this pasture in the 1997 Castle Creek Allotment Analysis, Interpretation, and Evaluation (BLM 1997). However, no records of this population exist on file at the BLM or with the Idaho Fish & Game Conservation Data Center (CDC). The exact location or condition of this population was not provided in the Castle Creek document. This dwarf, perennial species is typically found in mountain big sagebrush and low sagebrush communities, sometimes on the edge of the juniper zone. Pasture 17 does provide appropriate habitat for this species and numerous documented occurrences of this species are known from the surrounding area. The critical growth period for this species is from May to late July.

Habitat also exists in this pasture for Simpson's hedgehog cactus (*Pediocactus simpsonii*) which is on the BLM watch list (Type 5). Simpson's hedgehog cactus occurs on rocky or sandy benches and canyon rims. This plant has no specific phenologically "critical" period since it remains above ground all year and is subject to herbivory or mechanical disturbance at any time.

There are no known populations of Proposed, listed Threatened, or listed Endangered plants (Type 1) in this allotment. However, the USFWS considers all of Idaho to be within the potential range of Ute ladies'-tresses (*Spiranthes diluvialis*), a federally threatened orchid species. This plant occurs in spring, seep, and riparian habitats. Due to the difficulty in narrowly defining potential habitat for this species, USFWS has chosen to apply a loose definition and requires Section 7 consultation only in three counties of southeast Idaho or in areas where the plant is actually found (USFWS 2002). Surveys specifically for this plant are recommended prior to authorizing federal actions in southwest Idaho, but not required. This plant will not be discussed further.

Environmental Consequences –Special Status Plants

Alternative A

Since there is so little information about SSP in this allotment, an evaluation of current livestock management can only be discussed in general terms. The current fall grazing schedule is outside or towards the end of the active growth season for most upland SSP that could occur in this pasture. Impacts from livestock grazing on Mud Flat milkvetch plants have typically been reported from concentrated use (Mancuso & Moseley 1993), such as trampling around water sources or salting sites near existing populations. This species is rarely eaten by cattle due to its small stature. Simpson's hedgehog cactus is typically resilient to livestock grazing pressure, due to its rocky habitat and its protective spines, which prevent trampling and herbivory. Overall, most impacts to upland SSP that may occur in this pasture would be limited to areas of higher concentration, but it is unknown if impacts of this type are occurring anywhere in this pasture.

Alternative B
Under the proposed management this pasture would be grazed by sheep in the spring, summer, or fall based on the discretion of the permittee. Grazing under this scenario could occur during the active growth period for SSP that may occur in this pasture and could result in slightly reduced vigor and reproductive ability of these plants. As in Alternative A, most impacts to upland SSP in this pasture would be expected around areas of higher concentration. However, because sheep are more adapted than cattle to grazing on steeper slopes and rougher terrain, utilization in these areas would likely be greater than under Alternative A. Sheep would be more likely to utilize Simpson's hedgehog cactus habitat than cattle. Sheep are also more likely to utilize forbs at a greater intensity than cattle, which could result in herbivory of Mud Flat milkvetch plants and a potential decrease in reproductive capability compared to Alternative A.

Recreation and Visual Resources

Affected Environment – Recreation and Visual Resources
Pasture 17 is lightly used by recreationists for upland bird and big game hunting, bird-watching, nature study, hiking and photography (RMIS 2006). This pasture may be used by commercial outfitters authorized to conduct hunting, camping and hiking trips in this portion of the field office. This pasture is located about a mile from the Owyhee Uplands National Back Country Byway, an improved gravel road that is a popular scenic drive for visitors to public land. Because of the pasture's close proximity to the Byway, it is relatively easy for recreationists to access on foot.

Public land in pasture 17 is classified as Visual Resource Management (VRM) Class II and Class III. In Class II areas, the objective is to retain the existing character of the landscape. In Class III areas, changes to the characteristic landscape should be moderate. This pasture is scenic, with a mix of steep and rolling hills, views of distant peaks and ridges, rhyolitic tuft outcrops, and small aspen groves.

Environmental Consequences –Recreation and Visual Resources

Alternative A
Areas where livestock congregate would continue to negatively affect recreationists' experiences, due to altered vegetation and soils, and animal waste (Hensiek 2002). The impacts of Alternative A would be the same as current management. There would be no effect on VRM.

Alternative B
More intensive grazing of steep slopes, forbs and shrubs by sheep would lead to a decrease in wildlife use of the area and of hunting, nature study and photographic opportunities for recreationists. It would also slightly diminish the scenic quality of the area. A significant decrease in the wild sheep population would negatively affect recreationists' wildlife viewing opportunities, commercial sheep hunting, and private bighorn sheep hunting opportunities in other parts of the field office.

Wilderness Study Areas

Affected Environment – Wilderness Study Areas
There are no wilderness study areas within pasture 17. This pasture is located approximately .6 mile from the boundary of the Little Jacks Creek Wilderness Study Area (WSA).

Environmental Consequences –Wilderness Study Areas

Alternative A
No known impacts would occur under this alternative.

Alternative B
The Little Jacks Creek WSA boundary is approximately .6 mile from pasture 17, and two other WSAs are contiguous with the Little Jacks Creek WSA. One of the identified special features of Little Jacks Creek as well as the two adjacent WSAs is the presence of California bighorn sheep (USDI 1991). If disease was transmitted from the domestic sheep to the wild sheep and led to a significant decrease in the wild sheep population, it would negatively affect this wilderness value. BLM policy requires the agency to manage WSAs so as not to impair the existing wilderness values (USDI 1995a).

Cumulative Impacts

The Council on Environmental Quality (CEQ) regulations that implement NEPA define a cumulative impact as: "The impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions." Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR 1508.7). The cumulative impact assessment area for this EA is Owyhee County in southwest Idaho, and adjacent northern Nevada and southeast Oregon.

Alternative A
No cumulative impacts are known or expected to occur.

Alternative B
Westwide, bighorn sheep populations have been recovering since reintroductions began in the 1960's and 70's, though populations are estimated to be less than 10% of pre-settlement populations (Schommer and Woolever 2001). Although there have been a number of die-offs which have slowed population growth or eliminated populations, bighorns as a whole are increasing where they are separate from domestic sheep. The cumulative impact of a potential die-off of the Jacks Creek herd added to other die-offs would be further slowing of the rate of growth of the bighorn population in the West.

In Southwest Idaho, bighorn sheep have declined by half from a peak in 1997 of about 1,400 animals to about 700 in 2006 (see Table 1). The causes of the decline are not known. Bighorns were tested for disease, but that does not appear to be a factor (Jon Rachael, IDFG SW Region, pers. comm.) A doctoral study indicated predation by cougars may be a factor, and that is currently being investigated by IDFG. The cumulative effect of a pneumonia outbreak added to

the recent decline could be to drive the herds to such low numbers that they may not be viable. Additionally, such a set-back or loss after over 40 years of recovery efforts by the Idaho Department of Fish and Game would make it difficult to re-initiate recovery efforts.

CONSULTATION AND COORDINATION

Interdisciplinary Team Members

The Environmental Assessment was prepared by an Interdisciplinary Team (ID Team) shown in the table below.

Name	Title	Responsibility
Mitchell Jaurena	Bruneau Field Office Manager	Assist with editing of the Final Environmental Assessment.
John Biar	Assistant Bruneau Field Office Manager & District Rangeland Management Specialist	Assist with editing of the Final Environmental Assessment.
Karen Colson	Botanist	ID team lead. BLM Special Status Plant sections.
Pam Druliner	Ecologist	Upland Vegetation sections.
Mike Boltz	Rangeland Management Specialist	Preparation of allotment information, livestock use history, actual use, and acres/aum.
Paul Seronko	Soil Scientist	Soil/Watershed sections.
Helen Ulmschneider	Wildlife Biologist	BLM Special Status Animals and wildlife habitat sections, assisted with map and photo preparation.
Bruce Zoellick	Fisheries Biologist	Riparian Areas and Wetlands sections.
Judi Zuckert	Outdoor Recreation Planner	Recreation, VRM and Wilderness sections.
Lois Palmgren	Archeology Technician	Cultural Resources specialist.
Gene Dana	Geographic Information Specialist	Preparation of maps.

List of Agencies, Organizations, and Individuals Consulted

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ATTACHMENT 1: **Comment letter by Dr. Marie Bulgin and BLM response.**
Letter is copied verbatim, but paragraph numbers are added.

"Marie Bulgin" <mbulgin@uidaho.edu>
03/16/2007 11:49 AM

Dear Ms Colson,

1. These are my comments in regard to the Findings of Significant Impact and EIA of the East Castle Creek Pasture 17 for conversion to sheep grazing.

2. As an introduction, I would like to say that I, as a University Professor and Veterinarian that is involved in the teaching and research concerning food animal, have been involved in the resarch of Pastuerella transmission to Big Horn Sheep for 17 years.

3. My veterinary medical expertise in the area of clinical disease, production management (herd medicine) and research in small ruminants gives me a breadth of knowledge that probably makes me unique as far as my outlook on this problem.

4. Presently, I am also the president of the Idaho Wool Growers that in some peoples eyes, makes me suspect to those who oppose my viewpoint. However, I would like empathisize, I am a professional and a researcher. My real interest is the truth. Aslo, the bench work that has been done at the University of Idaho has been done by competent and excellent microbiologists--not by me and the conclusions were drawn by them, not me..

5. The belief by many that "disease transmission from domestic sheep is a primary mortality factor for bighorn sheep." is the premise that has fired this whole bighorn/domestic sheep debate. However, seventeen years plus of research by our microbiologists looking at every die-off that has occurred in the western U. S. has not been able to prove that such is the case.

6. The scientific basis for the premise of transmission is based only upon a couple of studies that actually did not support any widespread die-offs following bighorn contact with goats or domestic sheep. For example, Rudolph et al. (2003) and Weiser et al. (2003) showed sharing of three Pasterurella strains between two feral goats and three bighorn found within 30 yards of each other in Hells Canyon metapopulation did not extend past the animals in the 30 yard area. Rather, these studies showed a multitude of different strains were present and that none could be traced to any contact with any domestic animals. Note also that these papers, especially the Rudolph paper, which is often erroneously cited as proof of transmission from goat to bighorn, actually stress that only limited sharing could be found and the direction of transmission could not be determined.

7. Furthermore, bighorns are documented to die off without exposure to domestic sheep. Onderka and Wishart (1984) reported a major die-off of bighorn sheep not associated with domestic sheep. They attributed the disease to a strain of P. haemolytica unique to bighorn sheep. Buechner (1960), Spraker et al., 1984 and Bailey (1986) also reported die-offs in bighorn sheep populations without known exposure to domestic sheep.

8. Those in various envieronment groups say that "it is well established in the literature and accepted by experts on these diseases that Mannheimia haemolytica and other closely related Pasteurella bacteria are readily transmitted from domestic sheep to bighorn sheep." Unfortunately this is not true either. Dr.

Foryet was able to demonstrate the death of big horn sheep captured and confined in a paddock with domestic sheep, but, unfortunately, he did not prove that it was Pasteurella transmitted from the domestics that killed the bighorns, or actually their own endogenous Pasteurella flora. One of the the points in the executive summary agreed on by the National Forest Service Scientific Panel which you no doubt are relying on, admits "Pasteurellaceae, other bacteria, viruses, and other agents may occur in healthy, free-ranging bighorn sheep." Thus, the extraordinary stress placed upon a wild animal housed in such surroundings as a domestic sheep paddock could certainly exacerbate a fatal disease from their own opportunistic flora. This commonly happens in domestic cattle and sheep when stress is combined with crowding, handling and a new and strange environment. Why shouldn't it also happen in a wild species?

9. Pasteurella spp. contains a huge group of bacteria that has been associated with disease in cats, pigs, all ruminants, rabbits and rodents. The group has been divided into several genera, a number of species, then further into strains, genotypes and biotypes and still further into DNA types. In early and even recent reports of die-offs, the ability to differentiate between different strains and biotypes of Pasteurella had either not yet been developed or not used. I want to emphasize, Pasteurella is not just Pasteurella.

10. Dr. Ward, an University of Idaho microbiologist during more than 20 years of experience with processing thousands of samples from multiple animal species for pathogenic bacteria, perfected fingerprinting or DNA testing of Pasteurella species and established numerous strains and biotypes. By doing this, he could identify specific organisms and determine whether they traveled from one animal to another. Now, if a Pasteurella-caused disease originated from a domestic sheep or goat, it can be followed back to the domestic animal at fault. Dr. Ward has published over 15 reports in refereed journals concerning Pasteurella species isolated from bighorn, domestic sheep and other wild species.

11. Additionally, he has collected the largest library of Pasteurella organisms in the world, most of which have been collected from bighorns. Ward and his associate, Dr. Glen Weiser, also working at the Caine Veterinary Center for the University of Idaho have also worked with Wildlife managers all over the Western U.S., Canada and Alaska trying to identify the cause of bighorn die-offs and prove or disprove the current belief that domestic sheep are responsible for bighorn demise. He has worked with Nevada Division of Wildlife, for example, to capture bighorn and domestic sheep that had been observed jointly occupying portions of four different mountain ranges. Animals were captured; swabs of nasal and pharynx passages were analyzed for identical organisms. In only one case, one domestic and 3 bighorns shared an organism with the same biotype. None of the other domestic and bighorn sheep had a Pasteurella in common. There were no sick or dying animals observed either then or later.

12. As a matter of fact, there is only circumstantial evidence of any die-off in free roaming bighorns being caused by domestic sheep in the 17 years of looking. It even appears that Pasteurella-Manheimia spp. are actually somewhat host specific.

13. Everyone recognizes the high value, including economic benefits associated with the bighorn species, although people touting the hunting value amuses me, somewhat. Are we asking that domestic sheep permittees lose their livelihood when permits are revoked (because that IS the result of revoking sheep grazing permits) so that a wealthy hunter can hang a bighorn sheep head on his wall. Hunting aside, there is no question that we all, including the sheep producers, want the bighorn to survive.

14. Unfortunately, the concept of the "extensive science" on actual disease transmission referred to by some of the anti-domestic sheep groups is misconceived. There is NO science that shows Pastuerella transmission from domestics to free-ranging bighorns. Furthermore, for definitive answers, the

discussion by the Science Panel brought together by the Forest Service leaves a lot to be desired. Their second point in their executive summary states: The complete range of mechanisms/causal agents that lead to epizootic disease events cannot be conclusively proven at this point. This ambiguous statement is true of all disease.

15. Their next point is: Given the statement above, it is prudent to undertake management to prevent contact between these species." This sounds reasonable, but let me put it in another context. We know that Neisseria meningitis tends to affect young people in somewhat confined and crowded conditions. We lose military recruits and college students to this nasty disease almost every year. Since we don't understand the range of mechanisms/causal agents that lead to this epizootic disease event, the prudent response might seem to be to keep young people from going to college or to military training camps. After all, the risk of lost of human life is at stake and the research is far more definitive than it is in the case of bighorn sheep.

16. In other words, let's concentrate on responsible, flexible management options to reduce contact possibilities, rather than over-reacting with an outright ban on all traditional grazing activities.

17. The great diversity of Pasteurella species isolated from the bighorn sheep in Hells Canyon referred to earlier (Rudolph 2003) was not indicative of a single point source. The involvement of multiple opportunistic pathogens present in that bighorn sheep population, points out that the true definitive cause is yet a mystery which has nothing to do with the presence or absence of domesticated sheep.

18. That mystery is the one that wildlife groups, Fish and Game personnel and other researchers need to pursue. Unfortunately, research dollars are hard to come by for wildlife research and if FNAWS and the Wildlife Societies wanted to really help the legacy of bighorn sheep, they should not be listening to the emotional diatribe of others. They should do some objective research on their own by reading the actual research articles with an open mind, then help fund those researchers that have good, well planned and well carried out scientific research and help finance their research.

19. However, research concerning transmission of Pastuerella from domestics to bighorns HAS been done. Seventeen years of it! For those who say the research is inconclusive, what is inconclusive about 17 years of negative results? How many more years do the livestock managers need before they will believe the evidence. Twenty--Fifty?

20. Please find attached a list of published scientific acticles by researchers from the Caine Veterinary Center. How about reading them for yourselves? If you find them unavailable, I'll be glad to send you copies.

Sincerely,
Marie Bulgin

Marie S. Bulgin, DVM
Small Ruminant Specialist
Professor University of Idaho
Caine Veterinary Teaching Center Coordinator, Caldwell Idaho
President of the Idaho Woolgrowers Assoc.

Response to Comments by Dr. Marie Bulgin on Draft EA, email of 3/16/2007

by Helen Ulmschneider, Wildlife Biologist, Bruneau FO BLM
March-May, 2007

Excerpts from Dr. Bulgin's email are in italics; my analysis is in normal type. I tried to provide Dr. Bulgin's points in context, and also combined paragraphs from different places in her letter that addressed the same points. I had an extended phone conversation with Dr. Bulgin on May 11, 2007, discussing her letter, and she stated that her comment letter was actually first prepared for the Payette Forest management plan and she just forwarded it for this EA. Therefore, some of Dr. Bulgin's comments on the economic impacts are not relevant for this action, but I have responded to economic impacts on p. 37. The main topics that are addressed below are:

- 17 years of research at the Caine Veterinary Center.
- Dr. Ward's paper "*Pasteurella* spp. in sympatric bighorn and domestic sheep" examining 4 cases of bighorn and domestic sheep contact or probable contact in Nevada.
- A pneumonia epidemic in Hells Canyon in 1995 that may have originated from a feral goat.
- Social and economic arguments.

17 years of research at the Caine Veterinary Center

Dr Bulgin's most basic point seems to be that in 17 years of research on this topic at the Caine Veterinary Center, they have not proven disease transmission from domestic sheep to bighorns in any major die-off. She wrote (numbers denote paragraphs in her letter)*:*

5: "The belief by many that "disease transmission from domestic sheep is a primary mortality factor for bighorn sheep." is the premise that has fired this whole bighorn/domestic sheep debate. However, seventeen years plus of research by our microbiologists looking at every die-off that has occurred in the western U. S. has not been able to prove that such is the case.
12: … As a matter of fact, there is only circumstantial evidence of any die-off in free roaming bighorns being caused by domestic sheep in the 17 years of looking.
19: However, research concerning transmission of Pastuerella from domestics to bighorns HAS been done. Seventeen years of it! For those who say the research is inconclusive, what is inconclusive about 17 years of negative results? How many more years do the livestock managers need before they will believe the evidence. Twenty--Fifty?"

The most basic answer to this argument is that nothing has been proven either way from the Caine Veterinary Center's research. I am aware of three published papers out of the Caine Veterinary Center, one paper on sheep and bighorns in 4 mountain ranges in Nevada (Ward et al. 1997) and two papers on a bighorn pneumonia epidemic in Hells Canyon after contact with a feral goat (Rudolph et al. 2003 and Weiser et al. 2003), discussed below. Dr. Bulgin's argument would be much stronger if she had provided a list or table of other unpublished studies, if there are any, from the 17 years of research, with dates, places, situations, results. In our phone conversation, I asked for such a list, but Dr. Bulgin said she could not provide one because she did not work on them first-hand, and referred me to Dr. Ward. From Dr. Ward's comments to the Payette Forest Plan, which Dr. Bulgin attached to her letter, in which he describes his work over the 17 years, it appears he was obtaining cultures and documenting the diversity of *Pasteurella* from bighorns all over the West. He does not describe any cases that would support the idea that domestic sheep are not a disease risk for bighorns.

I discuss the two published cases (Nevada and Hells Canyon) in detail in separate sections below, but here is a short summary. Both of the published cases showed transmission of bacteria on the range from sheep and goats to bighorns, but it was limited to a few animals. In Nevada, (Ward et al. 1997), the one transmission case that was proven did not result in a pneumonia epidemic, but 2 other herds that he studied after sheep contact died out with cause unknown. The Rudolph and Weiser papers showed transmission of several bacteria species on the range from a goat to several bighorns, but could not link a subsequent pneumonia epidemic to the *P. multocida* strain transmitted by the one goat found with the bighorns. The epidemic was not linked to any one strain of *P. multocida,* and the cause was left unexplained, but it may have been *P. multocida* interaction with another disease agent such as a virus or mycoplasma (phone conversation with Dr. Bulgin), which they did not study.

The disease model that is implicit in Dr. Bulgin's comments is that one bacteria is the cause, and they are trying to find that one bacteria and see if it came from domestic sheep. Researchers are now thinking this model may be too simplistic (The Idaho Statesman 2006). It may be synergistic interactions of several disease organisms, such as mycoplasma or virus with *Pasteurella*, horizontal gene transfer among different strains of bacteria, or some other mechanism now unknown that causes die-offs.

Dr. Bulgin's letter enumerates some of the difficulties of studying the problem; these difficulties to me explain why 17 years of research has not solved the problem. *Pasturella* bacteria are very complex, with many types and various classification schemes. You can't see the differences between the types, they are inferred from different biochemical tests and DNA analysis. Dr. Ward at the Caine Veterinary Center developed DNA fingerprinting techniques to use with these bacteria, and now they should theoretically be able to track transmission, given appropriate situations, and given that the cause of epidemics is only bacterial. These techniques were being developed largely by the Caine Veterinary Center during those 17 years. Safaee et al. (2006) show that bacteria in bighorns detected with "culture-independent" methods reveal microbial diversity an order of magnitude higher than with traditional culture-based methods. This is because a few big blobs on a culture plate can overrun smaller blobs, to put it in familiar terms. Thus, the bacteria being DNA tested after conventional culturing techniques is from only a small percentage of the bacteria present, and transmitted bacteria can be missed.

Just the on-the-ground logistics of studying this problem are daunting. Samples from bighorns need to be collected within 12-24 hours of the death of the animal, and this is difficult with a free-ranging animal that occupies remote rugged canyons and cliffs. Also, how and where on the animal the sample is taken, what medium it is stored on, how it is handled during transmission to a lab, and how fast it is cultured all affect the viability of the bacteria for culturing. All of these details were not known during earlier studies. Further, both the sheep and the bighorns would need to be sampled before and after the transmission incident to conclusively prove the direction of transmission. Rarely have those circumstances come together, but there is the Hunter et al. (in prep) paper, out of the Idaho Wildlife Health lab and the Caine Veterinary Center, showing transmission of fatal bacteria from domestic sheep to a bighorn in the wild.

Dr. Bulgin seems to implicitly define "science" as "bacteriologic proof by DNA studies", when she states that (paragraph 6) "*The scientific basis for the premise of transmission is based only upon a couple of studies…*" She later contradicts herself by stating (paragraph 14) "*Unfortunately, the concept of the "extensive science" on actual disease transmission referred to by some of the anti-domestic sheep groups is misconceived. There is NO science that shows Pastuerella transmission from domestics to free-ranging bighorns*." Hunter et al. (in prep) and Ward et al. 1997 both showed transmission between

domestic sheep and free-ranging bighorns of *Pasteurella*; and Rudolph et al. 2003 shows probable transmission between domestic goats and bighorns. But science is not just DNA studies, it is also all the other kinds of evidence detailed in the EA and the cited papers.

These are basic facts:

- Bighorns in pens and in large exclosures exposed to domestic sheep die of acute pneumonia very rapidly, after months or years of being healthy in captivity.
- Actual transmission of bacteria between domestics and bighorns under range conditions has been proven by several bacteriologic DNA studies.
- Many cases of pneumonia die-offs in bighorns after exposure to domestic sheep have been documented around the West and Canada. Many cases contain strong circumstantial evidence, everything but the DNA, so to speak, not weak circumstantial evidence. Some of these are detailed in the EA and below.

Game and land managers must make decisions based on all the evidence out there. It would be unreasonable to ignore all the evidence because they did not contain DNA evidence.

Perhaps part of the difficulty of studying the problem is that managers are alert to the danger of contact between the species, bighorns are usually introduced where there aren't domestic sheep, and both are removed from the wild if contact occurs. Thus the potential cases to study are rare because of the very management practices that are recommended in papers by Drs. Ward and Weiser of the Caine Veterinary Center, among others.

In her first sentence, Dr. Bulgin does not accurately state the basic question. The question is not whether disease from domestic sheep is currently a primary mortality factor for bighorns, the question is whether domestic sheep can pose a serious disease risk to bighorns. Currently, managers make every effort to limit contact between bighorns and domestic sheep; therefore, westwide, it probably is not a primary mortality factor anymore. In our phone conversation, she emphasized that bighorns have pneumonia die-offs unrelated to domestic sheep, and this is true. However, it does not change the fact that domestic sheep also can cause pneumonia die-offs in bighorns.

Hells Canyon Goat Transmission Papers (Rudolph et al. 2003, Weiser et al. 2003):

6: The scientific basis for the premise of transmission is based only upon a couple of studies that actually did not support any widespread dieoffs following bighorn contact with goats or domestic sheep. For example, Rudolph et al. (2003) and Weiser et al. (2003) showed sharing of three Pasterurella strains between two feral goats and three bighorn found within 30 yards of each other in Hells Canyon metapopulation did not extend past the animals in the 30 yard area. Rather, these studies showed a multitude of different strains were present and that none could be traced to any contact with any domestic animals. Note also that these papers, especially the Rudolph paper, which is often erroneously cited as proof of transmission from goat to bighorn, actually stress that only limited sharing could be found and the direction of transmission could not be determined.

The Hells Canyon goat papers (Rudolph et al. 2003, Weiser et al. 2003) used DNA studies to examine whether there was transmission of disease-causing bacteria from feral domestic goats that led to a pneumonia die-off in bighorns. A feral goat was first seen with a herd of bighorns on Nov. 2 and 3, 1995. On Nov. 29 the goat and a bighorn ram and ewe were observed separated from the herd, the ewe had respiratory disease, and the three were shot in an attempt to prevent transmission of disease. Autopsies and samples were taken on site. Two other feral goats were also found across the river,

removed, and tested. Within the next 3 to 4 months, 20 bighorns were found dead or sick within a radius of about 30 km from the original goat. Pneumonia was the cause of death of one sheep that died on Nov. 22, 1995 in the area. Another 72 remaining bighorns in the area were captured and removed to the Idaho Wildlife Health Lab in Caldwell to prevent further transmission of disease; 64 of these died of pneumonia. The first two bighorns and the goat each had identical forms of *Pasteurella multocida*. Additionally, the goat and the ewe shared identical strains of *P. haemolytica* biovariant 1. The authors state:

> *"Biovariant 1 strains are most commonly associated with domestic livestock. …Because samples were not obtained from the animals prior to contact, the direction of transmission could not be ascertained with certainty. The fact that identical strains of Pastuerella, particularly biovariant 1 P. haemolytica, were isolated from both goats and bighorn sheep is suggestive of transmission of the organisms from goats to bighorn sheep."*

However, the rest of the bighorns in the subsequent pneumonia epidemic did not share these DNA types, and so there was no evidence that organisms from the goats had caused the epidemic. The ultimate cause of the epidemic remained undetermined. *P. multocida* was the species cultured in large numbers, but it was quite variable among the dead and dying bighorn – no individual strain was identified as the deadly one.

Nevada domestic and bighorn sheep paper (Ward et al. 1997):

11: …"Ward and his associate, Dr. Glen Weiser, also working at the Caine Center for the University of Idaho have also worked with Wildlife managers all over the Western US, Canada and Alaska trying to identify the cause of bighorn die-offs and prove or disprove the current belief that domestic sheep are responsible for bighorn demise. He has worked with Nevada Division of Wildlife, for example, to capture bighorn and domestic sheep that had been observed jointly occupying portions of four different mountain ranges. Animals were captured; swabs of nasal and pharynx passages were analyzed for identical organisms. In only one case, one domestic and 3 bighorns shared an organism with the same biotype. None of the other domestic and bighorn sheep had a Pasteurella in common. There were no sick or dying animals observed either then or later.

The Ward et al. (1997) paper from Nevada is an example of the difficulty of studying this problem. Ward et al. sampled bacteria from bighorns and domestic sheep in 4 mountain ranges in Nevada where the two species were seen or suspected of intermingling. He confirmed transmission of bacteria between one domestic sheep and several bighorns in the Granite Range, but not in any of the other 3 ranges. The transmission did not result in a pneumonia outbreak in the bighorns in the Granite herd. Two of the other herds sampled did die out within one and two years, but they were unable to find the dead or dying animals, and give no explanation for the die-offs. It was difficult to follow the story for each mountain range from the published paper, so I constructed a table to put the story together for each case from the information in Ward et al.:

Ward et al 1997: *Pasteurella* spp. in sympatric bighorn and domestic sheep.

Where	Date of Contact	Domestics contacted	Bighorns tested	Trans-mission proven	Bighorn Herd fate	Year --- Bighorn population numbers
East Range	Fall 91	4 adult Female 400 m. from water source ≥ 2 wks	4 in Jan. '92; 3 in Jan 93	No	Died out	'84 89 90 **91** 92 93 94 --- 24 36 31 22 <22 9 0
Tobin Mtn	Grazing season 1991	portion of flock trespassed for 2-4 wk (10 tested from flock)	1 in Jan. '92	No	Died out	'84 **91** 92 93 --- 45 18 added 1 0
Desatoya Mtn	Fall 92 2 wks	Adult Female w/ lamb	15 in Jan, May, Dec 1993	No	Increased	'86 89 93 95 --- 31 42 71 99
Granite Range	Oct 92 2 wks	1 male, shared bacteria with 3 BHS	15: 4 in Oct 92, 11 in Jan, May, Dec 93	Yes	Increased	'80 89 91 **92** 93 94 95 --- begin57 64 76 81 83 96

Ward states that transmission could have occurred that they did not detect, because their methods missed much of the bacterial diversity that was there (see Safaee et al. 2006). Additionally, though not discussed in the paper as a factor limiting the reliability of their study, the bighorns that they did sample were captured several months to a year after the contacts and may not have been the same animals that contacted the domestic sheep, and in fact may have been a biased sample – only the ones that survived – never having found the dead animals.

Additionally, in the Tobin Range, the domestic sheep that Ward sampled may not have been the same animals that may have contacted bighorns. During the grazing season of 1991, there was "probable" contact with a portion of a herd of domestic sheep from a neighboring ranch. Later, Ward sampled 10 domestic sheep out of the flock, not knowing which ones trespassed on the bighorn range. Eighteen bighorns were added to the herd in Oct. 1991; and in January of 1992, when they attempted to capture the bighorns, only one bighorn remained alive to sample. In reference to this situation, Dr. Bulgin states in her letter that "*there were no sick or dying animals observed either then or later*" without clarifying that the herds did actually die out. They never found the dead animals, but obviously there were dead animals. Laboratory style "experimental" science is difficult to come by "in the field". They couldn't catch the bighorns right away, they couldn't find the dead animals to test for bacteria, they didn't know which domestic sheep were the trespassers…that is normal for field biology.

The conclusions that I could come to from Ward et al. 1997 were: transmission of bacteria under range conditions was proven in one case, but in that case a die-off did not occur, and in fact the herd thrived. However, two other herds died out after possible contact with more than one individual sheep (4, and 'a portion of a flock"). The study simply lacked reliability to say what happened in those other cases, whether domestic sheep were the cause or not. The authors do not mention that in past studies, not all individuals of domestic sheep tested carried the lethal strains. Thus the fact that exposure to one individual sheep, with resulting transmission of bacteria, did not result in a pneumonia epidemic fits with known facts, but does not disprove that there is risk. The authors agree; Ward concludes:

"Although disease and transmission may not occur in all instances when bighorn sheep contact domestic sheep, recommendations for management of domestic sheep on or near bighorn range should be followed to prevent potential for transmission of diseases to bighorn sheep." Dr. Bulgin also appears to agree that there is enough evidence of risk to warrant reducing contact: (paragraph 16) "*let's concentrate on responsible, flexible management options to reduce contact possibilities."*

Ward et al. 1997 was not a definitive study. It discusses at length all the types of bacteria found, but information on the actual circumstances on the range of the contacts, of how long after contact bighorns were sampled, of whether it was the same bighorns, of how much they looked for dead or dying animals, and of other pieces of the story are limited or unreported. It doesn't discuss that in the two cases where the herd subsequently thrived, contact with only one domestic sheep or one ewe-and-lamb was involved, and that other studies have shown that not every domestic sheep in a trial had the fatal bacteria. It doesn't offer any information about or explanation of why the other two populations may have died out.

Dr Foreyt's Papers: stress from close confinement?:
8…Dr. Foryet was able to demonstrate the death of big horn sheep captured and confined in a paddock with domestic sheep, but, unfortunately, he did not prove that it was Pasteurella transmitted from the domestics that killed the bighorns, or actually their own endogenous Pasteurella flora.

9. One of the points in the executive summary agreed on by the National Forest Service Scientific Panel which you no doubt are relying on, admits "Pasteurellaceae, other bacteria, viruses, and other agents may occur in healthy, free-ranging bighorn sheep." Thus, the extraordinary stress placed upon a wild animal housed in such surroundings as a domestic sheep paddock could certainly exacerbate a fatal disease from their own opportunistic flora. This commonly happens in domestic cattle and sheep when stress is combined with crowding, handling and a new and strange environment. Why shouldn't it also happen in a wild species?

Foreyt (1982) detailed two cases in California and Washington of bighorns dieing soon after exposure to domestic sheep. In Lava Beds National Monument, California, a herd of 43 bighorns had been kept in a very large exclosure of close to two square miles (445 ha, not a "sheep paddock") for 9 years, and were "in excellent physical condition" and reproducing. In mid–June 1980, domestic sheep were intensively grazed along 2 sides of the exclosure, and nose-to-nose fenceline contact was noted. Approximately 8 bighorns died during the first 10 days of July, of *Pastuerella* pneumonia. "All 43 bighorn sheep were presumed dead by August 15, 1980, since no live animals could be located." Culturing studies could not be done because the bighorns were found too long after death.

In Washington, in January 1979, 8 wild bighorns were transported to a 2.5 ha enclosure in a remote area with a natural stream, native trees, shrubs, and grasses. The bighorns lambed there and the lambs and adults thrived over the summer. After 10 months in the enclosure, on Nov. 2, 1979, 11 healthy domestic sheep were placed in the enclosure with the bighorns. On 28 Nov., 7 bighorns were found dead. They had been dead too long for taking bacterial samples. The domestic sheep were removed on Dec 8. 1979, and the remaining 7 bighorns appeared healthy. Six of the seven were found dead on Jan. 29, 1980, and had been dead for several days. Examination revealed acute pneumonia in all animals from both episodes.

These cases are of bighorns habituated to semi-natural large pens that experienced die-offs when exposed to domestic cheep, not of "extraordinary stress placed upon a wild animal housed in a domestic sheep paddock" leading to pneumonia from their own endogenous bacteria. Foreyt later conducted further studies in other more confined settings, to determine what was transmitted, test vaccines, etc.

The animals were always habituated for months or years to captivity before the trials. It was not possible to conduct bacteriologic studies in the California and Washington cases, but this does not negate the facts described above. It is reasonable to conclude that disease from domestic sheep was the most likely explanation for the deaths of the bighorns in these cases, especially given all the other cases and studies.

Social and Economic Aspects

13: Everyone recognizes the high value, including economic benefits associated with the bighorn species, although people touting the hunting value amuses me, somewhat. Are we asking that domestic sheep permittees lose their livelihood when permits are revoked (because that IS the result of revoking sheep grazing permits) so that a wealthy hunter can hang a bighorn sheep head on his wall. Hunting aside, there is no question that we all, including the sheep producers, want the bighorn to survive. **…..**

15: Their next point is: Given the statement above, it is prudent to undertake management to prevent contact between these species." This sounds reasonable, but let me put it in another context. We know that Neisseria meningitis tends to affect young people in somewhat confined and crowded conditions. We lose military recruits and college students to this nasty disease almost every year. Since we don't understand the range of mechanisms/causal agents that lead to this epizootic disease event, the prudent response might seem to be to keep young people from going to college or to military training camps. After all, the risk of lost of human life is at stake and the research is far more definitive than it is in the case of bighorn sheep.

16 In other words, let's concentrate on responsible, flexible management options to reduce contact possibilities, rather than over-reacting with an outright ban on all traditional grazing activities.

This EA is about an application to convert 54 AUMs from cattle to sheep; 54 AUMs would permit 270 sheep for one month (1 Animal Unit Month = 5 sheep or 1 cow for a month), for a total cost of $72.90 ($1.35/AUM x 54). Mr. Anchustegui currently runs only cattle on the Bruneau BLM, owning the permits for 2,807 AUMs and leasing another 345 AUMs, in 3 different allotments. Thus the AUMs in question are 1.8% of the total of 3,011 AUMs currently licensed to Mr. Anchustegui in the Bruneau Field Office. Additionally, he grazes on the Shoshone BLM, the Four Rivers BLM, the Boise National Forest (NF), and the Sawtooth NF. An important point is that currently the Bruneau FO does not authorize any sheep grazing; all grazing is by cattle and horses. Most sheep grazing ended on the Bruneau FO in the 1960's; the last permit ended in 1974.

Mr. Anchustegui's application is for 54 AUMS from April 1 to November 30. The permit is flexible, and he could run more numbers for a shorter time for the same AUMs. Sheep are normally run on public range in bands of 1,000. Thus, for example, the time a whole band could be on pasture 17 would be less than a week. It would be difficult to create an economic argument that converting these 54 AUMs would be key or important to Mr. Anchustegui's livelihood, since he already runs cattle on the BLM and is continuing with cattle, and also runs whole bands of sheep in a number of other places. Additionally, the value of these AUMs is only $72.90; finding private grazing for these AUMs would not be difficult or very expensive. It is not *"revocation"* of a grazing permit, or *"an outright ban on all traditional grazing activities"*. If *"we all, including the sheep producers, want the bighorn to survive"*, it would be difficult for the BLM to argue that the value of these 54 AUMs as sheep AUMs instead of cattle to Mr. Anchustegui were more important than the risk of losing a long-established, major bighorn herd. When I talked about this with Dr. Bulgin in our phone conversation, she said that she would probably agree with this point.

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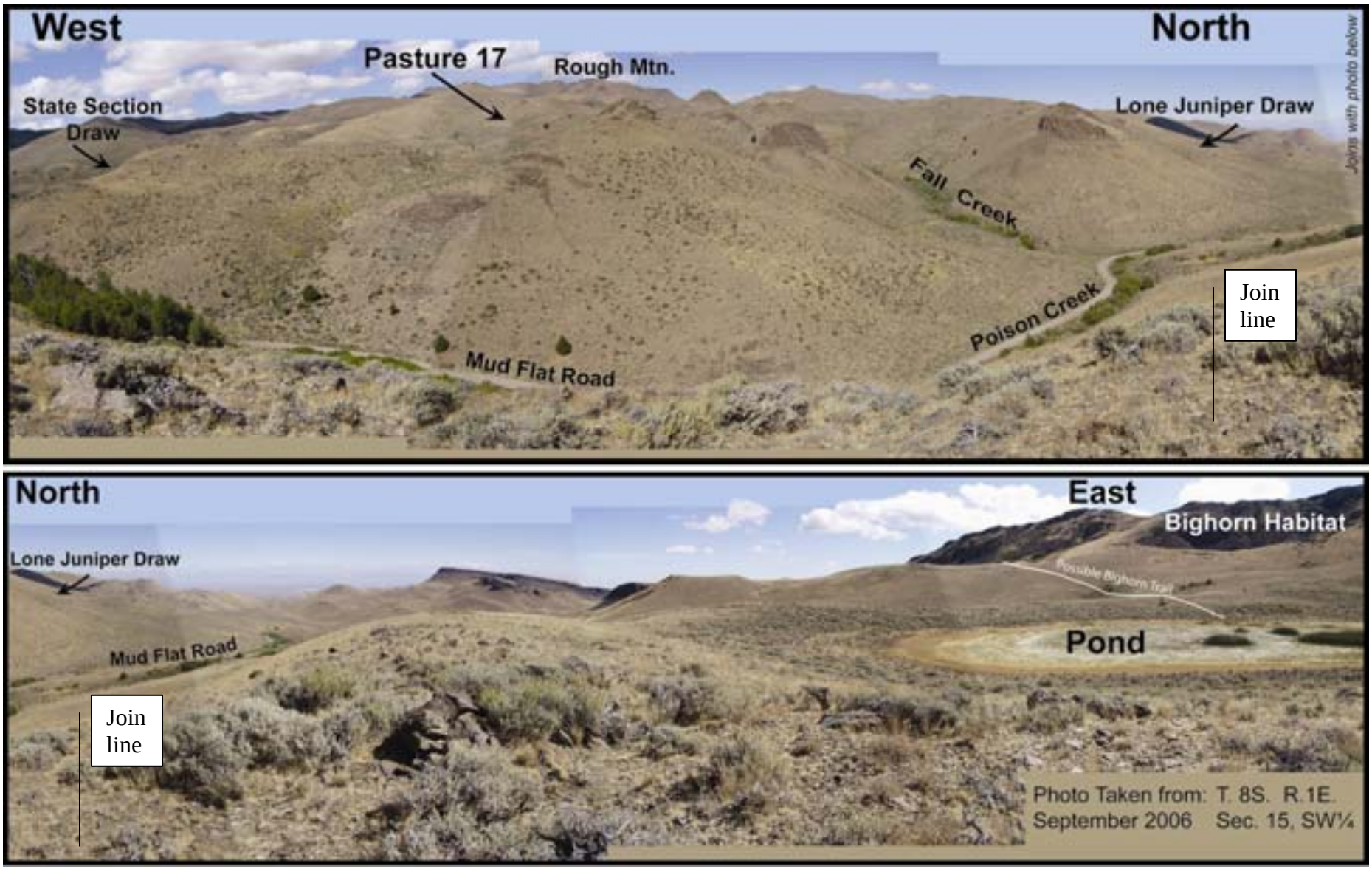

Attachment 2. West-to-east panorama of pasture 17 and bighorn habitat. Pasture 17 lies at the middle elevations between State Section and Lone Juniper Draws. Shoofly and Jacks Cr. bighorn habitat lies eastward. Castle Cr. allotment, Bruneau Resource Area, Boise District BLM, Idaho.